UNIVERSITI TEKNOLOGI MARA

THE ADAPTABILITY OF THE INDIGENOUS BEES, *Apis cerana* TO TOP-BAR HIVES IN SARAWAK

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Candidate's Declaration

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ABSTRACT

Beekeeping with indigenous bees, *Apis cerana,* in Sarawak is an aged-old tradition and passion among many of the rural communities. The use of the traditional log-hives using cutout tree trunks, bark and local lumber still exist. The introduction of modern beekeeping using the Malaysian modified Langstroth hives with movable-frame to the traditional beekeepers has met with limited success due to the high incidence of absconding. Therefore, there is a need to introduce more appropriate beekeeping technology such as the use of top-bar hives; commonly referred to as a transitional method of beekeeping. A 3x3x3 factorial experiment in a Complete Randomized Block Design (CRBD) was carried out to evaluate the adaptability of *Apis cerana* to top-bar hives. The research investigations conducted revealed three significant outcomes. Firstly, the comb-space for *Apis cerana* in the coconut growing areas of Kota Samarahan was 28 mm. Secondly, a measuring device using an acrylic plastic grid incorporated with the use of a digital camera and computer made sampling for data collection more efficient and effective. Thirdly, the indigenous bees of Sarawak can adapt to the use of top-bar hives. Experimentation with three levels of comb-space, 25 mm, 28 mm and 32 mm, revealed that the appropriate comb-space to be used for beehive design should be similar to the natural comb-space. Results revealed that the most appropriate comb-space was 28 mm and conclusively shown to be critical in the design of beehives. There were no burr-combs and subsequently nil stickiness among the frames or top-bars in hives with comb-space of 28 mm. The present adoption of the standard comb-space of 25 mm in Malaysian modified Langstroth hives could have been one of the reasons for the high frequency of indigenous bees to abscond. The findings also showed that adopting the correct comb-space could reduce the infestation by wax moth. This subsequently can reduce the incidence of absconding and hence enhance the productivity of local honey production. The research conducted explicitly indicates that *Apis cerana* was able to adapt to the use of top-bar hives. There were no significant differences in the growth of the combs and the broods among the three types of hive designs tested. There was also no incidence of wax moth infestation and no absconding in the Malaysian modified Langstroth beehives with top-bar. The Malaysian modified Langstroth hive with top-bar of width 28 mm is therefore recommended as the most appropriate beehive design for beekeepers in rural Sarawak.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Traditional beekeeping with the indigenous bees, *Apis cerana* (*A. cerana*) still exists and remains very much a passion among several rural communities in Sarawak, Malaysia. This gives a wonderful opportunity to explore and exploit traditional beekeeping practices by introducing some modern methods and technique. This would enhance the productivity of the hives, thereby generating some cash income to the rural communities.

Despite the existence and abundance of wild (feral) bee colonies found in both the lowlands and the highlands of Sarawak, beekeeping activity is unfortunately not being explored and exploited aggressively as a potential income or food generating activity. Identifying some of the major constraints, among which is the appropriateness of hive designs that can suit differing competency levels of beekeepers or potential beekeepers, will enable the active pursuits in beekeeping, thus enhancing the productivity and efficiency of the enterprise in Sarawak.

1.2 Problem Statement

The introduction of the modern method of beekeeping using the Langstroth beehive design by the Department of Agriculture, Sarawak over the last ten years has not been widely successful. Only a small percentage of beekeepers who were given government assistance have succeeded. This could be due to certain inherent shortcomings in the design of the beehives or the lack of the necessary knowledge and skill in the modern approach in beekeeping. Other causes of failure were the excessive predation by wasps, bee-eaters and failure of supersedure.

1.3 Objectives

The objectives of the research investigations were as follows:

1. to evaluate the adaptability of *A. cerana* to top-bar hives,
2. to determine the appropriate comb-space for *A. cerana* in Asajaya and
3. to develop an efficient and reliable device to measure the growth and development of bee colonies.